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THE RELATION OF EAR ROT PREVALENCE IN ILLINOIS CORN FIELDS TO EAR COVERAGE BY HUSKS

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THE RELATION OF EAR ROT PREVALENCE IN ILLINOIS CORN FIELDS TO EAR COVERAGE BY HUSKS

G. H. Boewe

In the fall of 1930, while examining Illinois corn fields to determine the prevalence of disease, casual observation seemed to indicate to the writer that ears poorly covered by husks were much more readily infected by rot-producing fungi than those that were well covered. In the main, ear rots are caused by fungi, the spores of which are carried directly to the ears by various agencies, chiefly the wind, although some infection results from the fungi which grow from the stalk into the ear. An ear completely enclosed by its husks during the entire course of its development would appear to have been protected from external infection, while an ear not completely covered would appear to have been exposed to external infection. Yet ears poorly covered often escape infection and many well covered ears become infected.

It seemed worthwhile, therefore, to determine whether any relation does exist between husk coverage of the corn ear and the prevalence of ear rots in Illinois corn fields. Data bearing on this point have been accumulated by direct field examination during the 5-year period, 1931-1935, and a total of 57,395 ears have been examined in 297 fields. Corn fields have been examined each year in all parts of the state, except in 1931, when only fields in the central part were examined. The number of fields and the number of ears examined have varied from year to year, as shown in Table 1, but in general both the number of fields and the number of ears examined tended to be greater in each succeeding year. Records for the entire period show

that fields were examined in 69 of the 102 counties in the State.

DEFINITION OF TERMS

Throughout this discussion "covered" and "well covered" are to be understood as signifying that ears so classed were covered completely by husks, including the tips, and that the husks remained tightly closed until near harvesting. For the first 2 years, 1931 and 1932, these terms apply rigidly to ears observed to be completely and tightly covered by husks when the fields were examined. "Open," "not covered," and "not well covered" signify that ears so classed were not completely covered, but no distinctions have been made relative to the degree of partial coverage and none is implied by the various terms used.

Since the data are concerned with visually discernible ear rots, "ears with visible infection" and "ears without visible infection" constitute the 2 classes into which corn ears were assorted upon examination. Ears were considered to be rot-free if, at the time of examination, no visible mold or fungus sporulation appeared on or between the kernels or on the cob. Naturally, no account could be taken of the hidden infections which require the use of a germinator for determination.

RELATIVE ABUNDANCE OF COVERED AND OPEN EARS

Since most of the corn seed used in Illinois is produced by open pollination and is genetically heterozygous, it might be expected that covered and open ears would be found to occur in approximately equal numbers. However, an increasing number of farmers are practicing field seed selection, and, since this involves the choice of covered in preference to open ears, the expected ratio may not be secured. It is commonly believed, also, that weather and other conditions tend to influence ear length and size, thereby determining whether the ears will be covered or not by the supposedly uniform husks.

In Illinois corn fields, as shown in Table 1, below, the number of open ears exceeds considerably the number of closed ears, in spite of the practice of selection and of any expected equality based on the genetic constitution of the crop. Over a

Table 1.-- Relative abundance of covered and open ears in Illinois corn fields, 1931-1935.

Year	Fields exam.	Ears exam.	Number of ears		Percent of ears	
			Open	Covered	Open	Covered
1931	26	7,800	5,314	2,486	68.1	31.9
1932	52	7,605	5,341	2,264	70.2	29.8
1933	51	9,300	5,300	4,000	57.0	43.0
1934	71	13,660	7,693	5,967	56.3	43.7
1935	78	15,880	8,424	7,456	53.0	47.0
Total	278	54,245				
Average					60.9	39.1

period of years, the average ratio of open to closed ears is almost exactly 3 to 2, and, although the ratio varies somewhat from year to year, the number of open ears exceeds the number of closed ears every year.

In a given year, considerable variation occurs in the relative number of open and closed ears in different fields, even in the same county. In Hancock County, for example, 2 fields examined in 1932 gave a ratio of open to covered ears of 4 to 1 and 2 to 3, and in Jasper County 2 fields gave ratios of 1 to 3 and 1 to 2. In 1934 and 1935, there was a larger average proportion of covered than of open ears in 5 fields in Piatt County, the ratio being 5 covered to 3 open ears, and in Edwards County in the same 2 years a ratio of 1.25 covered to 1 open was obtained.

Whenever the variety of corn in a field could be recognized, it was noted as a part of the data, and such records are combined in Table 2. Although the number of fields examined of each variety is small, a somewhat greater prevalence of covered ears is indicated for the Bloody Butcher, Calico, and Democrat varieties, while open ears predominate in the Krugg variety.

Table 2.-- Prevalence of open and covered ears in some corn varieties.

Variety	Fields exam.	Ears exam.	Number of ears Open	Covered	Ratio of open to covered ears
Bloody Butcher	2	200	64	136	1 : 2.1
Calico	4	700	322	378	1 : 1.2
Democrat	12	2,000	764	1,236	1 : 1.6
Krugg	2	502	325	177	1.8 : 1

FIELD PREVALENCE OF CORN EAR ROT

The presence of ear rot was determined in the field by pulling back the husks of each ear and examining it for the presence of fungus growth or sporulation, without removing the ear from the stalk. Ears that showed superficial characters of disease but no visible mold growth, as in Basisporium and some Diplodia infections, were broken to determine whether any mycelium, spores, or fungus fruiting bodies were present and were counted as rot-infected when these were found. Data were taken on this basis, which is designed to show the total field prevalence of ear rot regardless of particular causes, only during the 4 years, 1932-1935. A summary of them is presented above in Table 3.

Table 3.-- Prevalence of ear rot in Illinois corn fields, 1932-1935.

Year	Fields exam.	Ears exam.	Number of ears Rotted	Not rotted	Percent of ears Rotted	Not rotted
1932	48	7,005	3,911	3,094	55.8	44.2
1933	51	9,300	4,183	5,117	45.0	55.0
1934	71	13,660	12,359	1,301	90.5	9.5
1935	78	15,880	4,462	11,418	28.1	71.9
Total	248	45,845				
Average					54.8	45.2

Ear rot varied in prevalence from year to year, within wide limits, being least abundant in 1935, when 28.1 percent of the ears examined were infected, and most abundant in 1934, when 90.5 percent were infected. While various factors may have been concerned in these annual variations, as for example in 1934 when ear rot was undoubtedly greatly favored by prior damage done by corn ear worms, the significance of the ear rot problem in corn production is emphasized by the fact that of over 45,800 ears examined over a period of 4 years an average of almost 55 percent were visibly infected with one or another kind of rot.

RELATION OF EAR ROT PREVALENCE TO HUSK COVERAGE

Data on the relation of ear rot, without reference to particular causes, and husk coverage have been taken over a period of 3 years, 1933-1935, and are summarized in Tables 4 and 5. Among those ears not completely covered by husks ear rot prevailed, as shown in Table 4, to a high degree in 1933 and to an especially high degree in 1934, when the percentage of rot-infected ears exceeded the uninfected ears by nearly 85 percent; but in 1935 the rotted ears, while still constituting nearly a

Table 4.-- Prevalence of ear rot in corn ears not completely covered by husks, 1933-1935.

Year	Open ears examined	Number of ears		Percent of ears	
		Rotted	Not rotted	Rotted	Not rotted
1933	5,300	2,801	2,499	52.9	47.1
1934	7,693	7,101	592	92.3	7.7
1935	8,424	2,686	5,738	31.9	68.1
Average				59.0	41.0

third of the entire number, were less abundant than sound ears. In spite of these fluctuations, the average percentages for the 3 recorded years indicate a strong tendency for open ears to become infected more frequently than covered ears.

Among those ears completely covered by husks, ear rot prevailed to a high degree also, as indicated in Table 5, but the percentage of rotted ears was less than

the percentage of clean ears in both 1933 and 1935, while in 1934 the proportion of rotted ears greatly exceeded the proportion of clean ears. The average percentages

Table 5.-- Prevalence of ear rot in corn ears completely covered by husks, 1933-1935.

Year	Closed ears examined	Number of ears		Percent of ears	
		Rotted	Not rotted	Rotted	Not rotted
1933	4,000	1,382	2,618	34.6	65.4
1934	5,967	5,258	709	88.1	11.9
1935	7,456	1,776	5,680	23.8	76.2
Average				48.8	51.2

for the 3 years indicate that, among covered ears, there is a distinct tendency for clean ears to predominate.

Of more significance, however, is the direct comparison given in Figure 1 of the percentages recorded in Tables 4 and 5. In each of the 3 years, regardless of

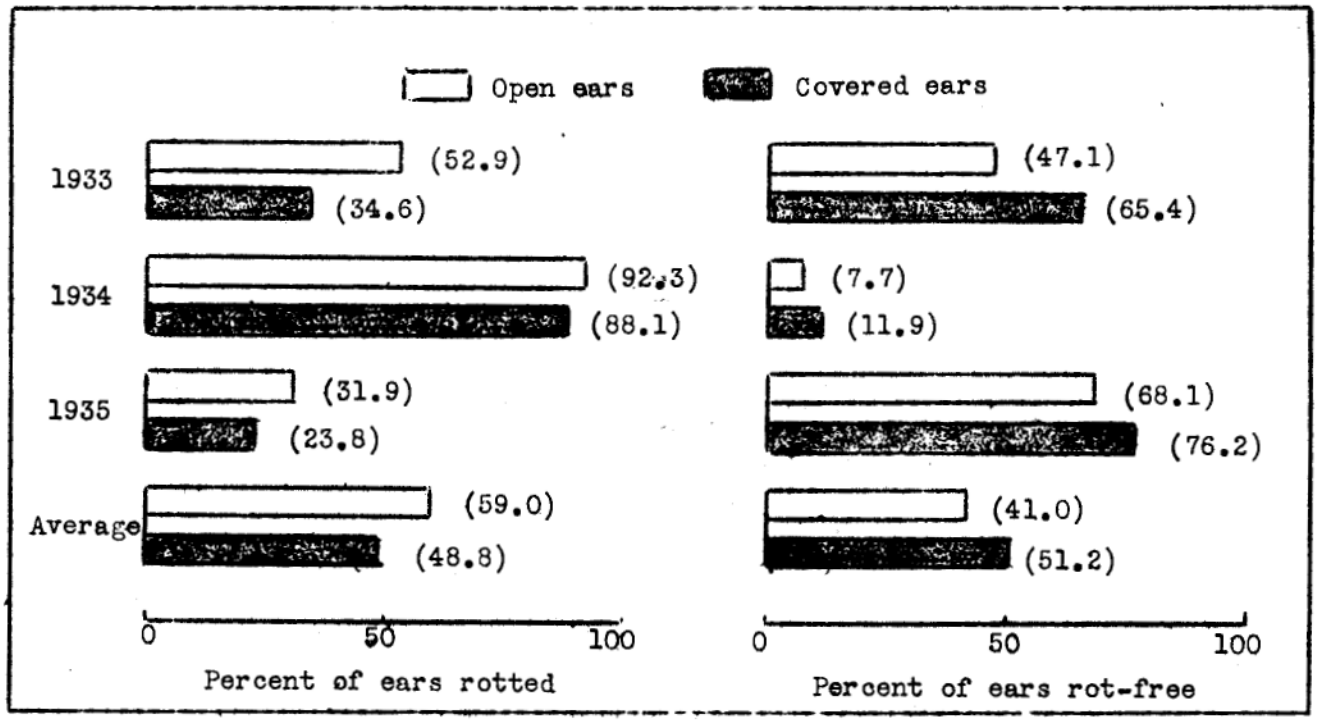

Fig. 1.-- Prevalence and absence of ear rot in open and covered corn ears, 1933-35.

the annual variation in prevalence, open ears were infected to a significantly greater extent than covered ears and, conversely, covered ears were free of rot infection to a significantly greater extent than open ears. Averages for the 3 years show a difference of 10.2 percent between open and covered ears, the open ears exceeding the covered ears to that extent in number of rotted ears, and the covered ears exceeding the open ears to the same extent in number of sound ears.

In the analysis presented in Table 6, in which the diseased ears found annually are assorted into open and closed groups and the number in each group is expressed as a percentage of the total, the difference between the percentages of open

Table 6.-- Prevalence of husk coverage types among rotted corn ears, 1933-1935.

Year	Rotted ears examined	Number of ears		Percent of ears		Excess of open, in percent
		Open	Covered	Open	Covered	
1933	4,183	2,801	1,382	67.0	33.0	34.0
1934	12,359	7,101	5,258	57.5	42.5	15.0
1935	4,462	2,686	1,776	60.2	39.8	20.4
Average				61.6	38.4	23.2

and closed infected ears each year shows consistently a marked preponderance of open rotted ears over covered rotted ears. This preponderance averages 23.2 percent for the 3-year period covered by the data.

FIELD PREVALENCE OF SPECIFIC EAR ROTS

The field prevalence of 8 of the more common and presumably more important corn ear diseases was determined annually during the 5 years, 1931-1935, by examining each year a large number of ears in a considerable number of fields. While the amount of data taken varied to some extent from year to year, as shown in Table 7, 297 fields were visited and 57,395 ears were examined during the period, and except

in 1931, when no work was done in the northern third, all sections of the state were represented in each year's data.

Table 7.-- Number of corn fields and ears examined for specific ear rots, 1931-1935.

Year	Fields examined	Ears examined
1931	44	10,850
1932	54	7,805
1933	50	9,200
1934	71	13,660
1935	78	15,880
Total	297	57,395

The diagnosis of specific rots was made in the field, for the most part; but, whenever the identity of a rot was questionable, a portion of the infected ear was saved for subsequent microscopic examination and identification. As a result, the actual number of ears affected with each rot, among all the ears examined, was recorded each year and indicates, on the basis of random sampling, the prevalence of each rot in each year. The recorded number of ears infected by each rot, when expressed as a percentage of the total number of ears examined each year, constitutes an index by means of which, as is done in Table 8, the relative abundance of several

Table 8.-- Field prevalence of 8 kinds of corn ear rot, 1931-1935.

Type of rot	Percent of ears rotted					
	1931	1932	1933	1934	1935	Average
Fusarium	24.0	42.4	34.6	80.6	22.0	40.7
Penicillium	11.5	6.2	4.9	4.1	2.3	5.8
Rhizopus	1.0	2.1	4.2	6.8	1.0	3.0
Smut	2.1	1.5	1.2	2.2	1.4	1.7
Diplodia	.5	1.3	2.6	1.4	.4	1.2
Gibberella	.64	.98	.32	.73	.94	.72
Basisporium	.58	.29	.36	.80	.76	.56
Aspergillus	.0	.04	.23	.83	.04	.23

rots can be shown for any year and the fluctuations of each in abundance from year to year can be ascertained readily. An average, for the 5 years covered by the data, of these yearly indexes may be considered to show with a fair degree of accuracy the average annual prevalence of each rot.

On this basis the several rots assume the order given in Table 8. Fusarium rot is shown to be the most prevalent, every year as well as in the average year, for which its index is 41 percent, while Penicillium rot stands second, with a moderate prevalence each year and an average annual prevalence of 6 percent. Between Fusarium and the remaining diseases a very large gap in both year-by-year and average prevalence is shown, the average index for Penicillium rot, most abundant of the 7, being less by 35 percent than that of Fusarium rot. The average annual indexes indicate, in fact, that over a period of years the last 7 of the 8 ear rots have an aggregate prevalence approximately one-third that of Fusarium rot.

In the annual variations there is no general agreement among the 8 rots as to trend for the entire period. There are, however, two rots which follow the same trend throughout the entire period. Rhizopus rot and Aspergillus rot both increase in prevalence in 1932 over 1931, in 1933 over 1932, and in 1934 over 1933, and both decline very markedly in 1935 from the high points of 1934. Smut and Basisporium rot also agree in trend, except for 1933, in which year the former declined from and the latter rose above the prevalence of the year before. With the other rots, similar trends may exist for short periods, but the parallelism does not hold for the entire number of years.

RELATION OF SPECIFIC EAR ROTS TO HUSK COVERAGE

When the data presented in the preceding section were taken, the corn ears affected with each rot were classified as to coverage by husks, according to the

standard described on page 2. With such data covering the entire 5-year period for 6 of the 8 rots and representing the natural fluctuation in prevalence of each rot from year to year under varied environmental conditions, the relationship of ear coverage to infection should be indicated rather accurately by the summaries presented in the following tables.

The relation of Fusarium infection to husk coverage is shown in Table 9. More diseased open than diseased closed ears were found in each of the 5 years, there

Table 9.-- Relation of Fusarium rotted ears to husk coverage, 1931-1935.

Year	Number of rotted ears		Percent of rotted ears		Excess of open, in percent
	Open	Covered	Open	Covered	
1931	2,622	827	76.0	24.0	52.0
1932	2,479	832	75.0	25.0	50.0
1933	2,272	916	71.3	28.7	42.6
1934	6,416	4,595	58.3	41.7	16.6
1935	2,208	1,292	63.1	36.9	26.2
Average			68.8	31.2	37.6

being 1.4 times as many infected ears in the open class as in the closed in 1934 and about 3 times as many in 1931 and 1932. Over the 5-year period, open ears averaged 68.8 percent and closed ears 31.2 percent of those infected by Fusarium, and for the entire period it appears significant that the preponderance of open infected over covered infected ears averaged 37.6 percent.

The relation of Penicillium rot to husk coverage is shown in Table 10. While there was some variation from year to year in the relative abundance of open and covered diseased ears, in each of the 5 years there were fewer diseased ears in the covered group than in the open group. The average for the 5 years shows annually

Table 10.-- Relation of Penicillium rotted ears to husk coverage, 1931-1935.

Year	Number of rotted ears		Percent of rotted ears		Excess of open, in percent
	Open	Covered	Open	Covered	
1931	682	413	62.3	37.7	24.6
1932	327	142	69.7	30.3	39.4
1933	286	166	63.3	36.7	26.6
1934	311	243	56.1	43.9	12.2
1935	211	153	57.8	42.2	15.6
Average			61.8	38.2	23.6

61.8 percent of the infected ears in the open class and only 38.2 percent in the closed class, or an average excess of open over covered infected ears of 23.6 percent.

Competent data on the occurrence of Rhizopus rot in relation to husk coverage were not taken in 1931, but this relationship, as shown by the data taken in the 4 following years, is indicated by the summary given in Table 11. While there is in this, as in the ear rot previously discussed, an apparent tendency for a greater pre-

Table 11.-- Relation of Rhizopus ear rot to husk coverage, 1931-1935.

Year	Number of rotted ears		Percent of rotted ears		Excess of open, in percent
	Open	Covered	Open	Covered	
1932	105	59	64.0	36.0	28.0
1933	215	167	56.3	43.7	12.6
1934	509	420	54.8	45.2	9.6
1935	67	87	43.5	56.5	- 13.0
Average			54.6	45.4	9.2

valence of infection, averaging 9.2 percent annually for the data given, to occur on open ears, the occurrence of a much greater quantity of infection in closed ears in 1935 suggests the existence of other factors predisposing to infection that may,

in some years at least, overcome the purely mechanical effect of perfect husk coverage.

Since no Aspergillus infection was found in 1931, data on its relationship to husk coverage are available only for the 4 years beginning with 1932. According to the summary shown in Table 12, no constant correlation appears to exist. While an

Table 12.-- Relation of Aspergillus rot to husk coverage, 1932-1935.

Year	Number of rotted ears		Percent of rotted ears		Excess of open, in percent
	Open	Covered	Open	Covered	
1932	1	2	33.3	66.7	- 33.4
1933	13	8	61.9	38.1	23.8
1934	61	53	53.5	46.5	7.0
1935	2	4	33.3	66.7	- 33.4
Average			45.5	54.5	- 9.0

average annual excess of 9.0 percent of infection is shown in covered ears, the 2 years of highest prevalence oppose the conclusion that open ears are less readily infected by showing a decided preponderance of open infected over closed infected ears. The data presented are both inconsistent and inconclusive with respect to husk coverage but suggest the operation of other, more important factors.

In determining the relationship of smut infection to ear coverage, the exact standard of differentiation adhered to in taking data for other diseases was found to be usable with difficulty, and the summary given in Table 13 should be considered in that light. Since any considerable number of infected kernels on an ear invariably results in the bursting open of the husks, because of the size of the smut galls, it is undoubtedly a fact that the very large differences in number and percentage of open infected and closed infected ears in reality grossly exaggerates

any tendency towards more frequent infection of ears exposed through incomplete husk coverage. But it can hardly be doubted that such a tendency does exist when, with reasonable care practiced in the classification of ears, an excess of open infected

Table 13.-- Relation of smut infected ears to husk coverage, 1931-1935.

Year	Number of infected ears		Percent of infected ears		Excess of open, in percent
	Open	Covered	Open	Covered	
1931	147	22	87.0	13.0	74.0
1932	60	4	93.7	6.3	87.4
1933	103	10	91.1	8.9	82.2
1934	262	43	85.9	14.1	71.8
1935	210	16	92.9	7.1	85.8
Average			90.1	9.9	80.2

over closed infected ears is found, ranging in different years from 71.8 to 87.4 percent and averaging annually 80.2 percent.

The assortment with respect to husk coverage of the Diplodia rotted ears found each year is shown in Table 14. In every year a greater number fell in the

Table 14.-- Relation of Diplodia rot to husk coverage, 1931-1935.

Year	Number of rotted ears		Percent of rotted ears		Excess of open, in percent
	Open	Covered	Open	Covered	
1931	13	16	44.8	55.2	- 10.4
1932	26	54	32.5	67.5	- 35.0
1933	103	133	43.6	56.4	- 12.8
1934	67	121	35.6	64.4	- 28.8
1935	23	38	37.7	62.3	- 24.6
Average			38.8	61.2	- 22.4

covered than in the open class, and for the 5 years concerned the open infected ears averaged 22.4 percent fewer annually than the covered infected ears. This negative

correlation between exposed ears and abundance of infection argues strongly against the protective effect of complete husk coverage and emphasizes to an equal degree the important role, in this disease, of ear invasion through the shank and silks.

The classification of the Gibberella infected ears with respect to husk coverage is given in Table 15. In 1931 and 1932 the open infected ears exceeded in number the covered infected ears, but in each of the 3 later years the reverse was

Table 15.-- Relation of Gibberella ear rot to husk coverage, 1931-1935.

Year	Number of rotted ears		Percent of rotted ears		Excess of open, in percent
	Open	Covered	Open	Covered	
1931	20	9	69.0	31.0	38.0
1932	26	19	57.8	42.2	15.6
1933	10	19	34.5	65.5	- 31.0
1934	33	67	33.0	67.0	- 34.0
1935	32	118	21.3	78.7	- 57.4
Average			43.1	56.9	- 13.7

true, so that for all the years considered open ears were fewer by 13.7 percent annually than covered ears in the infected lots. This general tendency seems to indicate that perfect coverage by husks is, in fact, no protection but may be conducive to a greater abundance of infection. Such a conclusion serves, perhaps, to emphasize the already recognized importance of infection by way of the silks.

The numbers and proportions of open and covered ears among the Basisporium infected ears found each year are given in Table 16. The number of infected ears found in 1931, 1932, and 1933 was small. A definite preponderance of open infected ears occurred in 1931 and 1932, but in each of the succeeding years covered infected ears predominated to such an extent that for all 5 years they exceed by an average of 9.6 percent annually the proportion of infected open ears. In this, as in the 2

ear rots just discussed, some correlation appears to exist between closed rather than open ears and abundance of disease, indicating that full husk coverage provides con-

Table 16.-- Relation of Basisporium cob rot to husk coverage, 1931-1935.

Year	Number of rotted ears		Percent of rotted ears		Excess of open, in percent
	Open	Covered	Open	Covered	
1931	31	7	81.6	18.4	63.2
1932	12	3	80.0	20.0	60.0
1933	6	27	18.2	81.8	- 63.6
1934	33	76	30.3	69.7	- 39.4
1935	19	101	15.8	84.2	- 68.4
Average			45.2	54.8	- 9.6

ditions favoring infection; but the occurrence in 2 years of more open diseased than covered diseased ears, together with the small average preponderance of covered diseased ears indicates also a degree of independence of ear coverage. In view of the wide distribution on living and dead plant materials of the causal fungus, as well as its strong saprophytism, it may be assumed that it finds the accumulation of pollen and plant refuse held, and perhaps kept favorably moist by long, enclosing husks especially satisfactory as a medium of primary development, from which subsequent infection may be accomplished.

Comparison of the Relations of Specific Ear Rots to Husk Coverage

While the general prevalence of ear rot, as indicated in a previous section, appears definitely correlated with imperfect coverage of corn ears, it will have been noticed in the preceding discussion of specific rots that there is no general agreement among them as to predominance of infection in either open or closed ears. With certain diseases, the preponderance of infection occurs in open ears; with others, it occurs in closed ears; and with some there is an alternation from one condition to the other in different years.

The usual relationships of infection to husk coverage, determined for each disease in previous tabulations by averaging the percentages of open and covered infected ears, and the differences between them, for the years during which each was observed, are brought together in Table 17 and are shown graphically in Figure 2. With this comparison as a basis, the 8 ear diseases can be considered to fall in 3 rather well defined groups.

The first of these, which includes smut, Fusarium rot, and Penicillium rot, may be considered to be favored to a considerable degree by imperfect husk coverage.

Table 17.-- Summary of the relation of individual rots to husk coverage, 1931-1935.

Type of rot	Average percent of rotted ears		Average excess of open, in percent
	Open	Covered	
Smut	90.1	9.9	80.2
Fusarium	68.8	31.2	37.6
Penicillium	61.8	38.2	23.6
Rhizopus	54.6	45.4	9.2
Aspergillus	45.5	54.5	- 9.0
Basisporium	45.2	54.8	- 9.6
Gibberella	43.1	56.9	- 13.7
Diplodia	38.8	61.2	- 22.4

The second group, which includes Rhizopus, Aspergillus, and Basisporium rot, probably depends very little upon imperfect coverage for the opportunity to infect but is influenced, as suggested in Tables 11, 12, and 16, to a large extent by environmental factors or by differences in development or condition of the corn plant itself.

The third group, in which are included Diplodia and Gibberella ear rot, appears to exhibit a marked negative correlation between abundance of infection and imperfect husk coverage, since in each case a considerably greater proportion of the infected ears were well covered by husks. The significance of this is not apparent

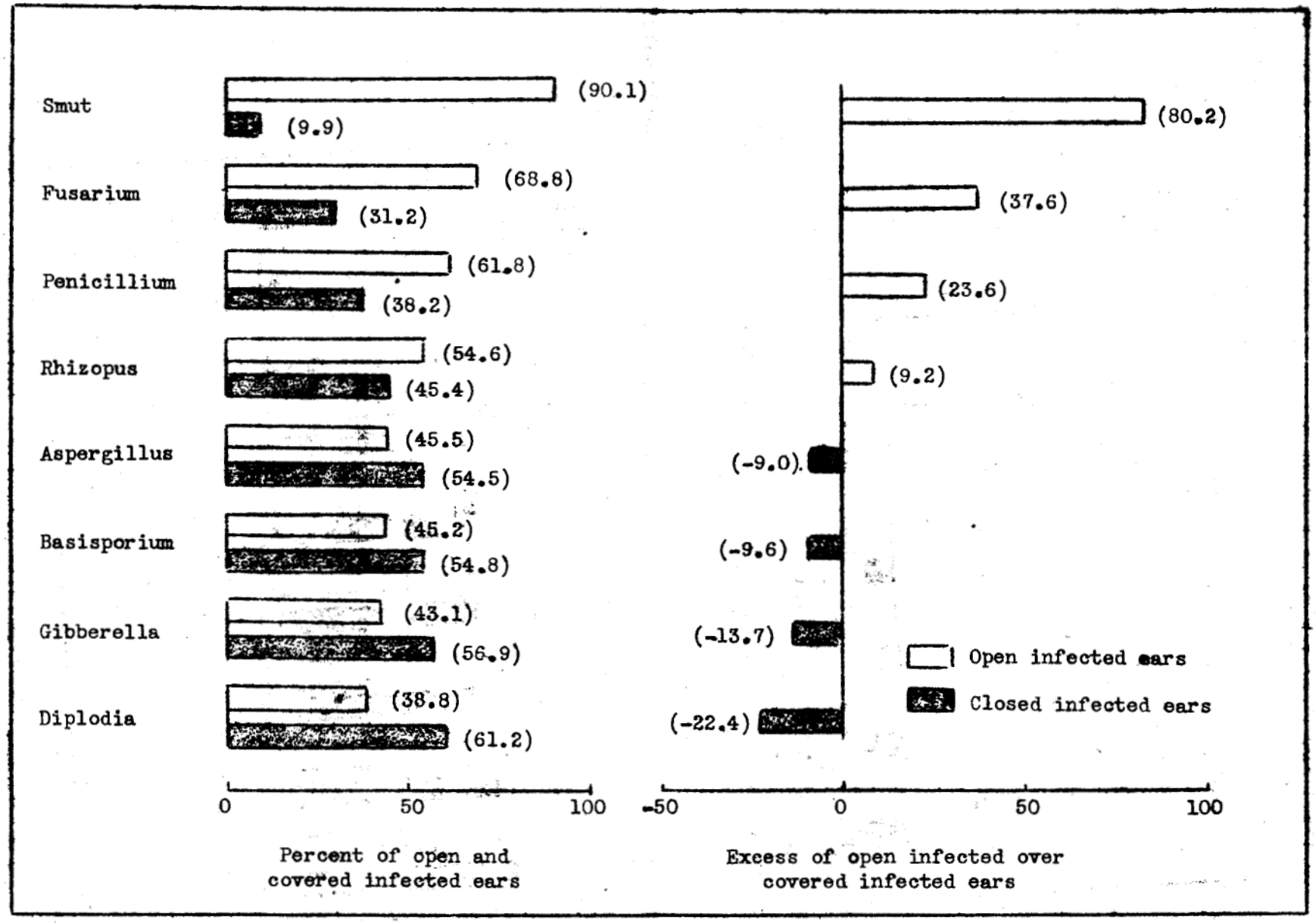

Fig. 2.— Comparison of the proportion of open and covered infected ears in certain corn ear rots.

for the known seasonal histories and methods of infection of the fungi concerned are such as to indicate that at least as great a number of open as covered ears should become infected. The data at hand obviously indicate that well covered ears present more favorable conditions for infection by these fungi, just as open ears do for Fusarium and Penicillium; but it is not possible to say what these conditions are. It is clear, however, that in this group of rots the mechanical protection afforded by perfect husk coverage is no deterent to infection.

SUMMARY

In order to determine what relationship might exist between the field prevalence of corn ear rot and the failure of husks to enclose the ear completely, data bearing on the question have been taken in Illinois corn fields during a period of 5 years, 1931-1935. A total of 57,395 ears have been examined in 297 fields representing all parts of the state. Analysis of the data so obtained has given the following information.

Imperfect coverage of ears by husks is more common than perfect coverage. The proportion of open ears varied from year to year, ranging from 53 to 70 percent, but averaged 61 percent for the entire period. (See pp. 2 - 4 and Tables 1 and 2.)

Ear rot is surprisingly prevalent in Illinois corn fields. Data taken during 4 years, 1932-1935, show a prevalence varying in different years from 28 to 90 percent, and an average of 55 percent annually. (See pp. 4 - 5 and Table 3.)

In corn ears not completely covered by husks the prevalence of rot ranged during 3 years, 1933-1935, from 40 to 92 percent and averaged 59 percent. In ears completely covered the prevalence of rot ranged from 24 to 88 percent and averaged 49 percent. Among the rot infected ears entering into the above data those with open husks constituted from 57 to 67 percent in different years and for the entire period

exceeded the covered infected ears by 23 percent. (See pp. 5 - 6, Tables 4 - 6, and Figure 1.)

Data bearing upon identified ear rots cover 5 growing seasons and indicate the following average prevalences for this period: Fusarium, 40.7 percent; Penicillium, 5.8 percent; Rhizopus, 3.0 percent; smut, 1.7 percent; Diplodia, 1.2 percent; Gibberella, 0.72 percent; Basisporium, 0.56 percent; and Aspergillus, 0.23 percent. Classification according to husk coverage of the ears observed to be infected by each fungus indicates that infection by smut, Fusarium, and Penicillium is favored by imperfect husk coverage, that infection by Rhizopus, Aspergillus, and Basisporium probably is neither hindered very greatly by perfect coverage nor favored to any marked degree by imperfect coverage, and that infection by Diplodia and Gibberella is in some way distinctly encouraged by perfect husk coverage. (See pp. 9 - 18, Tables 7 - 17, and Figure 2.)

The fact that imperfectly covered ears predominate in Illinois corn fields undoubtedly results in a greater prevalence of ear rot and in a larger field loss than would be the case if perfectly covered ears predominated. As an attack on the general problem of ear rot control, the development of corn varieties or selections characterized by complete coverage of the ear by husks presents an interesting problem, even though the data at hand indicate that general planting of such varieties would possibly result in an increased abundance of certain rots now of relatively infrequent field occurrence.

Little is known at present regarding the nature of the relation between length of ear and length of husk. Whether husk coverage is a character that is definitely heritable or whether it is determined by the vigor of ear growth should be ascertained. Should it prove to be heritable, combining it with genetic resistance to certain diseases in high yielding varieties should result in greatly reduced loss from ear rots.